

## REMARKS

Claims 8-17, 19 and 25-34 are pending. By this amendment, claims 1-7 and 18 are canceled, claims 8 and 19 are amended and claims 33 and 34 are added. Support for new claims 33 and 34 can be found on paragraph [0043] of the instant published US patent application No. 2005/0158955. No new matter has been added. Applicants respectfully request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

### ***Allowed Claims***

Applicants appreciate the indication that claim 17 is allowed. However, Applicants submit that all pending claims are in condition for allowance.

### ***35 U.S.C. § 103 Rejections***

#### ***Over Becker with Chen***

Claims 8-14, 19 and 25-30 were rejected under 35 U.S.C. § 103(a) for being allegedly unpatentable over US Patent No. 6,153,501 to BECKER in view of US Patent Application No. 2005/0136583 to CHEN et al. This rejection is respectfully traversed.

The Examiner acknowledges that BECKER fails to disclose, among other things, that a gate is about 60 nm wide, a spacer is about 50 nm wide, and the nitride film provides a stress of about 2.0 GPa, the enhanced stress in the transistor channel is greater than approximately  $4.5 \times 10^9$  dynes/cm<sup>2</sup> at about 5 nm below a gate oxide (claim 8) and that for a semiconductor device having a gate about 60 nm wide, a spacer about 50 nm wide, and a nitride film stress of about 2.0 GPa, the

enhanced stress in the transistor channel is greater than approximately  $5.5 \times 10^9$  dynes/cm<sup>2</sup> at about 5 nm below a gate oxide (claim 19). However, the Examiner explains, without citing any prior art, that the recited widths and stress values are merely optimum values which would have been obvious to one of ordinary skill in the art and that CHEN discloses the recited transistor channel enhanced stress and that it would have been obvious to combine the teachings of these documents. Applicant respectfully submits that a *prima facie* case of obviousness has not been established as the applied references fail to teach each and every element of the claims.

Applicants submit that no proper combination of BECKER and CHEN discloses or suggests the combination of features recited in at least independent claims 8 and 19.

Independent claim 8 recites, *inter alia*:

wherein a gate is about 60 nm wide, a spacer is about 50 nm wide, and the nitride film provides a stress of about 2.0 GPa, the enhanced stress in the transistor channel is greater than approximately  $4.5 \times 10^9$  dynes/cm<sup>2</sup> at about 5 nm below a gate oxide.

Independent claim 19 recites, *inter alia*:

wherein for a semiconductor device having a gate about 60 nm wide, a spacer about 50 nm wide, and a nitride film stress of about 2.0 GPa, the enhanced stress in the transistor channel is greater than approximately  $5.5 \times 10^9$  dynes/cm<sup>2</sup> at about 5 nm below a gate oxide.

As acknowledged by the Examiner, BECKER fails to disclose or suggest at least these features.

Applicants disagree, however, that CHEN cures the acknowledged deficiencies of BECKER. While the Examiner has identified paragraphs [0035] – [0038] as disclosing the recited tensile stress values, the Examiner has apparently failed to

appreciate the fact that CHEN discusses the recited tensile stress of the cap layer 24 and not of the transistor channel as recited in claims 8 and 19.

As explained above, claim 8 recites that the enhanced stress in the transistor channel is greater than approximately  $4.5 \times 10^9$  dynes/cm<sup>2</sup> at about 5 nm below a gate oxide. Furthermore, claim 19 recites that the enhanced stress in the transistor channel is greater than approximately  $5.5 \times 10^9$  dynes/cm<sup>2</sup> at about 5 nm below a gate oxide. On the other hand, paragraphs [0035] – [0038] of CHEN merely refers to the tensile stress of the capping layer 24. Nor has the Examiner demonstrated how utilizing the noted tensile stresses in the cap layer 24 results in corresponding values in the transistor channel.

With regard to the Examiner's assertions of the recited widths and stress values are merely optimum values, Applicants submit that the Examiner has provided no basis in the prior art to support this assertion. The Examiner's arguments thus essentially amount to an argument of official notice. In this regard, Applicants remind the Examiner that MPEP 2144.03 specifically explains that "[o]fficial notice unsupported by documentary evidence should only be taken by the examiner where the facts asserted to be well-known, or to be common knowledge in the art are capable of instant and unquestionable demonstration as being well-known." Accordingly, Applicants respectfully request that the Examiner produce documentary evidence to support the Examiner's assertions of official notice.

Finally, Applicants submit that dependent claims 9-14 and 25-30 recite additional features which, in combination with the above-noted features of claims 8 and 19, are not disclosed or suggested by any proper combination of BECKER and CHEN.

Accordingly, Applicant respectfully submits that the above-noted rejection under 35 U.S.C. § 103(a) should be withdrawn.

Over Becker with Chen and Pan

Claims 15, 16, 31 and 32 were rejected under 35 U.S.C. § 103(a) for being allegedly unpatentable over BECKER in view of CHEN and further in view of US Patent No. 6,198,144 to PAN et al. This rejection is respectfully traversed.

The Examiner acknowledges that BECKER/CHEN fails to disclose, among other things, the features recited in the above-noted dependent claims. However, the Examiner explains that PAN teaches the missing features of BECKER/CHEN and that it would have been obvious to combine the teachings of these documents. Applicant respectfully submits that a *prima facie* case of obviousness has not been established as the applied references fail to teach each and every element of the claims.

Applicant submits that no proper combination of BECKER, CHEN and PAN discloses or suggests the combination of features recited in at least independent claims 8 and 19. Again, the Examiner has acknowledged that BECKER fails to disclose or suggest at least these features. Furthermore, as explained above, CHEN fails to cure the acknowledged deficiencies of BECKER. While the Examiner has identified paragraphs [0035] – [0038] as disclosing the recited tensile stress values, the Examiner has failed to appreciate that CHEN discusses the recited tensile stress of the cap layer 24 and not of the transistor channel as recited in claims 8 and 19, as discussed above.

On the other hand, paragraphs [0035] – [0038] of CHEN merely refers to the tensile stress of the capping layer 24.

PAN also fails to cure the above-noted deficiencies of BECKER and CHEN. While Applicants acknowledge that the Abstract of PAN discloses that nitride spacers can be formed on sidewalls of a gate electrode stack, it is apparent from a fair review of PAN that this document, like that of BECKER, is entirely silent with regard to depositing a layer of nitride film over a gate stack and a surface of a substrate and removing the nitride film on the gate stack to provide enhanced stress in a transistor channel under the gate stack. Nor does PAN suggest the enhancement of transistor performance by creating a desired stress in the transistor channel region as is the case with the instant invention.

Accordingly, Applicant respectfully submits that the above-noted rejection under 35 U.S.C. § 103(a) should be withdrawn.

***New Claims are also Allowable***

Applicants submit that the new claims 33 and 34 are allowable over the applied art of record. Specifically, claims 33 and 34 depend from claim 8 which is believed to be allowable. Additionally, claim 33 and 34 recite a combination of features which are clearly not disclosed or suggested by the applied art of record. Accordingly, Applicants respectfully request consideration of these claims and further request that the above-noted claims be indicated as being allowable.

**Comments on Reasons for Allowance**

In response to the Statement of Reasons for Allowance set forth in the Office Action, Applicants wish to clarify the record with respect to the basis for the patentability of the indicated claims in the present application. In this regard, while Applicants do not disagree with the Examiner's indication that certain identified features are not disclosed by the references, Applicants submit that the claims in the present application recite a combination of features, and that the basis for patentability of these claims is based on the totality of the recited features.

**CONCLUSION**

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicants hereby make a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to **IBM Deposit Account No. 09-0458**.

Respectfully submitted,  
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